



## NUCLEAR REGULATORY COMMISSION

In the Matter of )  
 )  
ALL POWER REACTOR ) Docket Nos. (as shown in Attachment 1)  
LICENSEES AND HOLDERS ) License Nos. (as shown in Attachment 1) or  
OF CONSTRUCTION PERMITS IN ) Construction Permit Nos. (as shown in  
ACTIVE OR DEFERRED STATUS ) Attachment 1) )  
 )  
 ) EA-12-049

[NRC-2012-0068]

### **ORDER MODIFYING LICENSES WITH REGARD TO REQUIREMENTS FOR MITIGATION STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS (EFFECTIVE IMMEDIATELY)**

#### I.

The Licensees and construction permits (CP) holders<sup>1</sup> identified in Attachment 1 to this Order hold licenses and CPs issued by the U.S. Nuclear Regulatory Commission (NRC or Commission) authorizing operation and/or construction of nuclear power plants in accordance with the Atomic Energy Act of 1954, as amended, and Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," and Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."

#### II.

On March 11, 2011, a magnitude 9.0 earthquake struck off the coast of the Japanese island of Honshu. The earthquake resulted in a large tsunami, estimated to have exceeded 14 meters (45 feet) in height, that inundated the Fukushima Dai-ichi nuclear power plant site.

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<sup>1</sup> CP holders, as used in this Order, includes CPs, in active or deferred status, as identified in Attachment 1 to this Order (i.e., Watts Bar, Unit 2; and Bellefonte, Units 1 and 2)

The earthquake and tsunami produced widespread devastation across northeastern Japan and significantly affected the infrastructure and industry in the northeastern coastal areas of Japan.

When the earthquake occurred, Fukushima Dai-ichi Units 1, 2, and 3 were in operation and Units 4, 5, and 6 were shut down for routine refueling and maintenance activities. The Unit 4 reactor fuel was offloaded to the Unit 4 spent fuel pool (SFP). Following the earthquake, the three operating units automatically shut down and offsite power was lost to the entire facility. The emergency diesel generators (EDGs) started at all six units providing alternating current (ac) electrical power to critical systems at each unit. The facility response to the earthquake appears to have been normal.

Approximately 40 minutes following the earthquake and shutdown of the operating units, the first large tsunami wave inundated the site, followed by additional waves. The tsunami caused extensive damage to site facilities and resulted in a complete loss of all ac electrical power at Units 1 through 5, a condition known as station blackout. In addition, all direct current electrical power was lost early in the event on Units 1 and 2 and after some period of time at the other units. Unit 6 retained the function of one air-cooled EDG. Despite their actions, the operators lost the ability to cool the fuel in the Unit 1 reactor after several hours, in the Unit 2 reactor after about 70 hours, and in the Unit 3 reactor after about 36 hours, resulting in damage to the nuclear fuel shortly after the loss of cooling capabilities.

Following the events at the Fukushima Dai-ichi nuclear power plant, the NRC established a senior-level agency task force referred to as the Near-Term Task Force (NTTF). The NTTF was tasked with conducting a systematic and methodical review of the NRC regulations and processes and determining if the agency should make additional improvements to these programs in light of the events at Fukushima Dai-ichi. As a result of this review, the NTTF developed a comprehensive set of recommendations, documented in SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan,"

dated July 12, 2011. These recommendations were enhanced by the NRC staff following interactions with stakeholders. Documentation of the staff's efforts is contained in SECY-11-0124, "Recommended Actions to be Taken Without Delay From the Near-Term Task Force Report," dated September 9, 2011, and SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned," dated October 3, 2011.

As directed by the Commission's staff requirements memorandum (SRM) for SECY-11-0093, the NRC staff reviewed the NTTF recommendations within the context of the NRC's existing regulatory framework and considered the various regulatory vehicles available to the NRC to implement the recommendations. SECY-11-0124 and SECY-11-0137 established the staff's prioritization of the recommendations based upon the potential safety enhancements.

Since receiving the Commission's direction in SRM-SECY-11-0124 and SRM-SECY-11-0137, the NRC staff conducted public meetings to discuss enhanced mitigation strategies intended to maintain or restore core cooling, containment, and SFP cooling capabilities following beyond-design-basis external events. At these meetings, the industry described its proposal for a Diverse and Flexible Mitigation Capability (FLEX), as documented in the Nuclear Energy Institute's (NEI's) letter dated December 16, 2011 (Agency Documents Access and Management System (ADAMS) Accession No. ML11353A008). FLEX is proposed as a strategy to fulfill the key safety functions of core cooling, containment integrity, and spent fuel cooling. Stakeholder input influenced the staff to pursue a more performance-based approach to improve the safety of operating power reactors than envisioned in NTTF Recommendation 4.2, SECY-11-0124, and SECY-11-0137.

Current regulatory requirements and existing plant capabilities allow the NRC to conclude that a sequence of events such as the Fukushima Dai-ichi accident is unlikely to occur in the U.S. Therefore, continued operation and continued licensing activities do not pose an imminent threat to public health and safety. However, NRC's assessment of new insights from

the events at Fukushima Dai-ichi leads the staff to conclude that additional requirements must be imposed on Licensees or CP holders to increase the capability of nuclear power plants to mitigate beyond-design-basis external events. These additional requirements are needed to provide adequate protection to public health and safety, as set forth in Section III of this Order.

Guidance and strategies required by this Order would be available if the loss of power, motive force, and normal access to the ultimate heat sink to prevent fuel damage in the reactor and SFP, affected all units at a site simultaneously. This Order requires a three-phase approach for mitigating beyond-design-basis external events. The initial phase requires the use of installed equipment and resources to maintain or restore core cooling, containment, and SFP cooling. The transition phase requires providing sufficient, portable, onsite equipment and consumables to maintain or restore these functions until they can be accomplished with resources brought from off site. The final phase requires obtaining sufficient offsite resources to sustain those functions indefinitely.

Additional details on an acceptable approach for complying with this Order will be contained in final Interim Staff Guidance (ISG) scheduled to be issued by the NRC in August 2012. This guidance will also include a template to be used for the plan that will be submitted in accordance with Section IV, Condition C.1 below.

### III.

Reasonable assurance of adequate protection of the public health and safety and assurance of the common defense and security are the fundamental NRC regulatory objectives. Compliance with NRC requirements plays a critical role in giving the NRC confidence that Licensees or CP holders are maintaining an adequate level of public health and safety and common defense and security. While compliance with NRC requirements presumptively assures adequate protection, new information may reveal that additional requirements are

warranted. In such situations, the Commission may act in accordance with its statutory authority under Section 161 of the Atomic Energy Act of 1954, as amended, to require Licensees or CP holders to take action in order to protect health and safety and common defense and security.

To protect public health and safety from the inadvertent release of radioactive materials, the NRC's defense-in-depth strategy includes multiple layers of protection: (1) prevention of accidents by virtue of the design, construction, and operation of the plant; (2) mitigation features to prevent radioactive releases should an accident occur; and (3) emergency preparedness programs that include measures such as sheltering and evacuation. The defense-in-depth strategy also provides for multiple physical barriers to contain the radioactive materials in the event of an accident. The barriers are the fuel cladding, the reactor coolant pressure boundary, and the containment. These defense-in-depth features are embodied in the existing regulatory requirements and thereby provide adequate protection of the public health and safety.

Following the events of September 11, 2001, the NRC issued Order EA-02-026, dated February 25, 2002, which required Licensees to develop mitigating strategies related to the key safety functions of core cooling, containment, and SFP cooling. NEI Document 06-12, "B.5.b Phase 2 & 3 Submittal Guideline" (ADAMS Accession No. ML070090060) provides guidelines that describe the necessary mitigating strategies. The NRC endorsed these guidelines in a letter dated December 22, 2006, designated as Official Use Only. Those mitigating strategies were developed in the context of a localized event that was envisioned to challenge portions of a single unit. The events at Fukushima, however, demonstrate that beyond-design-basis external events may adversely affect: (1) more than one unit at a site with two or more units, and (2) multiple safety functions at each of several units located on the same site.

The events at Fukushima further highlight the possibility that extreme natural phenomena could challenge the prevention, mitigation, and emergency preparedness defense-

in-depth layers. To address the uncertainties associated with beyond-design-basis external events, the NRC is requiring additional defense-in-depth measures at licensed nuclear power reactors so that the NRC can continue to have reasonable assurance of adequate protection of public health and safety in mitigating the consequences of a beyond-design-basis external event.

The strategies and guidance developed and implemented by Licensees or CP holders in response to the requirements imposed by this Order will provide the necessary capabilities to supplement those of the permanently installed plant structures, systems, and components that could become unavailable following beyond-design-basis external events. These strategies and guidance will enhance the safety and preparedness capabilities established following September 11, 2001, and codified as 10 CFR 50.54(hh)(2). In order to address the potential for more widespread effects of beyond design basis external events, this Order requires strategies with increased capacity to implement protective actions concurrently at multiple units at a site. The strategies shall be developed to add multiple ways to maintain or restore core cooling, containment and SFP cooling capabilities in order to improve the defense-in-depth of licensed nuclear power reactors.

The Commission has determined that ensuring adequate protection of public health and safety requires that power reactor Licensees and CP holders develop, implement and maintain guidance and strategies to restore or maintain core cooling, containment, and SFP cooling capabilities in the event of a beyond-design-basis external event. These new requirements provide a greater mitigation capability consistent with the overall defense-in-depth philosophy, and, therefore, greater assurance that the challenges posed by beyond-design-basis external events to power reactors do not pose an undue risk to public health and safety. In order to provide reasonable assurance of adequate protection of public health and safety, all operating reactor licenses and CPs under Part 50 identified in Attachment 1 to this Order shall be modified

to include the requirements identified in Attachment 2 to this Order. All combined licenses (COLs) under 10 CFR Part 52 identified in Attachment 1 to this Order shall be modified to include the requirements identified in Attachment 3 to this Order.

Accordingly, the NRC has concluded that these measures are necessary to ensure adequate protection of public health and safety under the provisions of the backfit rule, 10 CFR 50.109(a)(4)(ii), and is requiring Licensee or CP holder action. In addition, pursuant to 10 CFR 2.202, the NRC finds that the public health, safety and interest require that this Order be made immediately effective.

#### IV.

Accordingly, pursuant to Sections 161b, 161i, 161o, and 182 of the Atomic Energy Act of 1954, as amended, and the Commission's regulations in 10 CFR 2.202, and 10 CFR Parts 50 and 52, IT IS HEREBY ORDERED, EFFECTIVE IMMEDIATELY, THAT ALL LICENSES AND CONSTRUCTION PERMITS IDENTIFIED IN ATTACHMENT 1 TO THIS ORDER ARE MODIFIED AS FOLLOWS:

- A. 1. All holders of CPs issued under Part 50 shall, notwithstanding the provisions of any Commission regulation or CPs to the contrary, comply with the requirements described in Attachment 2 to this Order except to the extent that a more stringent requirement is set forth in the CP. These CP holders shall complete full implementation **prior to issuance of an operating license.**
2. All holders of operating licenses issued under Part 50 shall, notwithstanding the provisions of any Commission regulation or license to the contrary, comply with the requirements described in Attachment 2 to this Order except to the extent that a more stringent requirement is set forth in the license. These Licensees shall promptly start implementation of the requirements in Attachment 2 to the

Order and shall complete full implementation **no later than two (2) refueling cycles after submittal of the overall integrated plan, as required in Condition C.1.a, or December 31, 2016, whichever comes first.**

3. All holders of COLs issued under Part 52 shall, notwithstanding the provisions of any Commission regulation or license to the contrary, comply with the requirements described in Attachment 3 to this Order except to the extent that a more stringent requirement is set forth in the license. These Licensees shall promptly start implementation of the requirements in Attachment 3 to the Order and shall complete full implementation prior to initial fuel load.
- B.
1. All Licensees and CP holders shall, within **twenty (20) days** of the date of this Order, notify the Commission, (1) if they are unable to comply with any of the requirements described in Attachment 2 or Attachment 3, (2) if compliance with any of the requirements is unnecessary in their specific circumstances, or (3) if implementation of any of the requirements would cause the Licensee or CP holder to be in violation of the provisions of any Commission regulation or the facility license. The notification shall provide the Licensee's or CP holder's justification for seeking relief from or variation of any specific requirement.
  2. Any Licensee or CP holder that considers that implementation of any of the requirements described in Attachment 2 or Attachment 3 to this Order would adversely impact safe and secure operation of the facility must notify the Commission, within **twenty (20) days** of this Order, of the adverse safety impact, the basis for its determination that the requirement has an adverse safety impact, and either a proposal for achieving the same objectives specified in Attachment 2 or Attachment 3 requirement in question, or a schedule for modifying the facility to address the adverse safety condition. If neither approach is appropriate, the



Licensee or CP holder must supplement its response to Condition B.1 of this Order to identify the condition as a requirement with which it cannot comply, with attendant justifications as required in Condition B.1.

- C. 1. a. All holders of operating licenses issued under Part 50 shall by **February 28, 2013**, submit to the Commission for review an overall integrated plan including a description of how compliance with the requirements described in Attachment 2 will be achieved.
- b. All holders of CPs issued under Part 50 or COLs issued under Part 52 shall, within **one (1) year** after issuance of the final ISG, submit to the Commission for review an overall integrated plan including a description of how compliance with the requirements described in Attachment 2 or Attachment 3 will be achieved.
- 2. All Licensees and holders of CPs shall provide an initial status report **sixty (60) days** following issuance of the final ISG and at **six (6)-month** intervals following submittal of the overall integrated plan, as required in Condition C.1, which delineates progress made in implementing the requirements of this Order.
- 3. All Licensees and CP holders shall report to the Commission when full compliance with the requirements described in Attachment 2 or Attachment 3 is achieved.

Licensee or CP holders responses to Conditions B.1, B.2, C.1, C.2, and C.3, above shall be submitted in accordance with 10 CFR 50.4 and 10 CFR 52.3, as applicable.

As applicable, the Director, Office of Nuclear Reactor Regulation or the Director, Office of New Reactors may, in writing, relax or rescind any of the above conditions upon demonstration by the Licensee or CP holder of good cause.

V.

In accordance with 10 CFR 2.202, the Licensee or CP holder must, and any other person adversely affected by this Order may, submit an answer to this Order, and may request a hearing on this Order, **within 20 days** of the date of this Order. Where good cause is shown, consideration will be given to extending the time to answer or to request a hearing. A request for extension of time in which to submit an answer or request a hearing must be made in writing to the Director, Office of Nuclear Reactor Regulation or to the Director, Office of New Reactors, U.S. Nuclear Regulatory Commission, Washington, DC 20555, and include a statement of good cause for the extension. The answer may consent to this Order.

If a hearing is requested by a Licensee, CP holder or a person whose interest is adversely affected, the Commission will issue an Order designating the time and place of any hearings. If a hearing is held, the issue to be considered at such hearing shall be whether this Order should be sustained. Pursuant to 10 CFR 2.202(c)(2)(i), the licensee, CP holder or any other person adversely affected by this Order, may, in addition to demanding a hearing, at the time the answer is filed or sooner, move the presiding officer to set aside the immediate effectiveness of the Order on the ground that the Order, including the need for immediate effectiveness, is not based on adequate evidence but on mere suspicion, unfounded allegations, or error.

All documents filed in NRC adjudicatory proceedings, including a request for hearing, a petition for leave to intervene, any motion or other document filed in the proceeding prior to the submission of a request for hearing or petition to intervene, and documents filed by interested governmental entities participating under 10 CFR 2.315(c), must be filed in accordance with the NRC E-Filing rule (72 FR 49139, August 28, 2007). The E-Filing process requires participants to submit and serve all adjudicatory documents over the internet, or in some cases to mail

copies on electronic storage media. Participants may not submit paper copies of their filings unless they seek an exemption in accordance with the procedures described below.

To comply with the procedural requirements of E-Filing, at least 10 days prior to the filing deadline, the participant should contact the Office of the Secretary by e-mail at [hearing.docket@nrc.gov](mailto:hearing.docket@nrc.gov), or by telephone at (301) 415-1677, to request (1) a digital ID certificate, which allows the participant (or its counsel or representative) to digitally sign documents and access the E-Submittal server for any proceeding in which it is participating; and (2) advise the Secretary that the participant will be submitting a request or petition for hearing (even in instances in which the participant, or its counsel or representative, already holds an NRC-issued digital ID certificate). Based upon this information, the Secretary will establish an electronic docket for the hearing in this proceeding if the Secretary has not already established an electronic docket.

Information about applying for a digital ID certificate is available on NRC's public Web site at <http://www.nrc.gov/site-help/e-submittals/apply-certificates.html>. System requirements for accessing the E-Submittal server are detailed in NRC's "Guidance for Electronic Submission," which is available on the agency's public Web site at <http://www.nrc.gov/site-help/e-submittals.html>. Participants may attempt to use other software not listed on the web site, but should note that the NRC's E-Filing system does not support unlisted software, and the NRC Meta System Help Desk will not be able to offer assistance in using unlisted software.

If a participant is electronically submitting a document to the NRC in accordance with the E-Filing rule, the participant must file the document using the NRC's online, web-based submission form. In order to serve documents through the Electronic Information Exchange, users will be required to install a web browser plug-in from the NRC web site. Further information on the web-based submission form, including the installation of the Web browser

plug-in, is available on the NRC's public Web site at <http://www.nrc.gov/site-help/e-submittals.html>.

Once a participant has obtained a digital ID certificate and a docket has been created, the participant can then submit a request for hearing or petition for leave to intervene. Submissions should be in Portable Document Format (PDF) in accordance with NRC guidance available on the NRC public Web site at <http://www.nrc.gov/site-help/e-submittals.html>. A filing is considered complete at the time the documents are submitted through the NRC's E-Filing system. To be timely, an electronic filing must be submitted to the E-Filing system no later than 11:59 p.m. Eastern Time on the due date. Upon receipt of a transmission, the E-Filing system time-stamps the document and sends the submitter an e-mail notice confirming receipt of the document. The E-Filing system also distributes an e-mail notice that provides access to the document to the NRC Office of the General Counsel and any others who have advised the Office of the Secretary that they wish to participate in the proceeding, so that the filer need not serve the documents on those participants separately. Therefore, applicants and other participants (or their counsel or representative) must apply for and receive a digital ID certificate before a hearing request/petition to intervene is filed so that they can obtain access to the document via the E-Filing system.

A person filing electronically using the agency's adjudicatory E-Filing system may seek assistance by contacting the NRC Meta System Help Desk through the "Contact Us" link located on the NRC Web site at <http://www.nrc.gov/site-help/e-submittals.html>, by e-mail at [MSHD.Resource@nrc.gov](mailto:MSHD.Resource@nrc.gov), or by a toll-free call at (866) 672-7640. The NRC Meta System Help Desk is available between 8 a.m. and 8 p.m., Eastern Time, Monday through Friday, excluding government holidays.

Participants who believe that they have a good cause for not submitting documents electronically must file an exemption request, in accordance with 10 CFR 2.302(g), with their

initial paper filing requesting authorization to continue to submit documents in paper format.

Such filings must be submitted by: (1) first class mail addressed to the Office of the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, Attention: Rulemaking and Adjudications Staff; or (2) courier, express mail, or expedited delivery service to the Office of the Secretary, Sixteenth Floor, One White Flint North, 11555 Rockville Pike, Rockville, Maryland, 20852, Attention: Rulemaking and Adjudications Staff. Participants filing a document in this manner are responsible for serving the document on all other participants. Filing is considered complete by first-class mail as of the time of deposit in the mail, or by courier, express mail, or expedited delivery service upon depositing the document with the provider of the service. A presiding officer, having granted an exemption request from using E-Filing, may require a participant or party to use E-Filing if the presiding officer subsequently determines that the reason for granting the exemption from use of E-Filing no longer exists.

Documents submitted in adjudicatory proceedings will appear in NRC's electronic hearing docket, which is available to the public at <http://ehd1.nrc.gov/ehd/>, unless excluded pursuant to an order of the Commission, or the presiding officer. Participants are requested not to include personal privacy information, such as social security numbers, home addresses, or home phone numbers in their filings, unless an NRC regulation or other law requires submission of such information. With respect to copyrighted works, except for limited excerpts that serve the purpose of the adjudicatory filings and would constitute a Fair Use application, participants are requested not to include copyrighted materials in their submission.

If a person other than the Licensee or CP holder requests a hearing, that person shall set forth with particularity the manner in which his interest is adversely affected by this Order and shall address the criteria set forth in 10 CFR 2.309(d).

In the absence of any request for hearing, or written approval of an extension of time in which to request a hearing, the provisions specified in Section IV above shall be final twenty

(20) days from the date of this Order without further order or proceedings. If an extension of time for requesting a hearing has been approved, the provisions specified in Section IV shall be final when the extension expires if a hearing request has not been received. AN ANSWER OR A REQUEST FOR HEARING SHALL NOT STAY THE IMMEDIATE EFFECTIVENESS OF THIS ORDER.

FOR THE NUCLEAR REGULATORY COMMISSION

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Eric J. Leeds, Director  
Office of Nuclear Reactor Regulation

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Michael R. Johnson, Director  
Office of New Reactors

Dated this 12th day of March 2012

POWER REACTOR LICENSEES AND HOLDERS OF  
CONSTRUCTION PERMITS IN ACTIVE OR DEFERRED STATUS

Arkansas Nuclear One

Entergy Operations, Inc.  
Docket Nos. 50-313 and 50-368  
License Nos. DPR-51 and NPF-6

Mr. Christopher J. Schwarz  
Vice President, Operations  
Entergy Operations, Inc.  
Arkansas Nuclear One  
1448 S.R. 333  
Russellville, AR 72802

Beaver Valley Power Station

First Energy Nuclear Operating Co.  
Docket Nos. 50-334 and 50-412  
License Nos. DPR-66 and NPF-73

Mr. Paul A. Harden  
Site Vice President  
FirstEnergy Nuclear Operating Company  
Mail Stop A-BV-SEB1  
P.O. Box 4, Route 168  
Shippingport, PA 15077

Bellefonte Nuclear Power Station

Tennessee Valley Authority  
Docket Nos. 50-438 and 50-439  
Construction Permit Nos. CPPR No. 122 and CPPR No. 123

Mr. Michael D. Skaggs  
Senior Vice President, Nuclear Generation Development and Construction  
Tennessee Valley Authority  
6A Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

Braidwood Station

Exelon Generation Co., LLC  
Docket Nos. STN 50-456 and STN 50-457  
License Nos. NPF-72 and NPF-77

Mr. Michael J. Pacilio  
President and Chief Nuclear Officer  
Exelon Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

Browns Ferry Nuclear Plant

Tennessee Valley Authority

Docket Nos. 50-259, 50-260 and 50-296

License Nos. DPR-33, DPR-52 and DPR-68

Mr. Preston D. Swafford

Chief Nuclear Officer and Executive Vice President

Tennessee Valley Authority

3R Lookout Place

1101 Market Street

Chattanooga, TN 37402-2801

Brunswick Steam Electric Plant

Carolina Power & Light Co.

Docket Nos. 50-325 and 50-324

License Nos. DPR-71 and DPR-62

Mr. Michael J. Annacone

Vice President

Carolina Power & Light Company

Brunswick Steam Electric Plant

P. O. Box 10429

Southport, NC 28461

Byron Station

Exelon Generation Co., LLC

Docket Nos. STN 50-454 and STN 50-455

License Nos. NPF-37 and NPF-66

Mr. Michael J. Pacilio

President and Chief Nuclear Officer

Exelon Nuclear

4300 Winfield Road

Warrenville, IL 60555

Callaway Plant

Union Electric Co.

Docket No. 50-483

License No. NPF-30

Mr. Adam C. Heflin

Senior Vice President and Chief Nuclear Officer

Union Electric Company

P. O. Box 620

Fulton, MO 65251



Calvert Cliffs Nuclear Power Plant

Calvert Cliffs Nuclear Power Plant, LLC  
Docket Nos. 50-317 and 50-318  
License Nos. DPR-53 and DPR-69

Mr. George H. Gellrich  
Vice President  
Calvert Cliffs Nuclear Power Plant, LLC  
Calvert Cliffs Nuclear Power Plant  
1650 Calvert Cliffs Parkway  
Lusby, MD 20657-4702

Catawba Nuclear Station

Duke Energy Carolinas, LLC  
Docket Nos. 50-413 and 50-414  
License Nos. NPF-35 and NPF-52

Mr. James R. Morris  
Site Vice President  
Duke Energy Carolinas, LLC  
Catawba Nuclear Station  
4800 Concord Road  
York, SC 29745

Clinton Power Station

Exelon Generation Co., LLC  
Docket No. 50-461  
License No. NPF-62

Mr. Michael J. Pacilio  
President and Chief Nuclear Officer  
Exelon Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

Columbia Generating Station

Energy Northwest  
Docket No. 50-397  
License No. NPF-21

Mr. Mark E. Reddemann  
Chief Executive Officer  
Energy Northwest  
MD 1023  
P.O. Box 968  
Richland, WA 99352

Comanche Peak Nuclear Power Plant

Luminant Generation Co., LLC  
Docket Nos. 50-445 and 50-446  
License Nos. NPF-87 and NPF-89

Mr. Rafael Flores  
Senior Vice President and Chief Nuclear Officer  
Luminant Generation Company, LLC  
Attn: Regulatory Affairs  
P. O. Box 1002  
Glen Rose, TX 76043

Cooper Nuclear Station

Nebraska Public Power District  
Docket No. 50-298  
License No. DPR-46

Mr. Brian J. O'Grady  
Vice President - Nuclear and Chief Nuclear Officer  
Nebraska Public Power District  
72676 648A Avenue  
P.O. Box 98  
Brownville, NE 68321

Crystal River Nuclear Generating Plant

Florida Power Corp.  
Docket No. 50-302  
License No. DPR-72

Mr. Jon A. Franke  
Vice President  
Attn: Supervisor, Licensing & Regulatory Affairs  
Progress Energy, Inc.  
Crystal River Nuclear Plant (NA2C)  
15760 West Power Line Street  
Crystal River, FL 34428-6708

Davis-Besse Nuclear Power Station

First Energy Nuclear Operating Co.  
Docket No. 50-346  
License No. NPF-3

Mr. Barry S. Allen  
Site Vice President  
FirstEnergy Nuclear Operating Company  
c/o Davis-Besse NPS  
5501 N. State Route 2  
Oak Harbor, OH 43449-9760

Diablo Canyon Power Plant

Pacific Gas & Electric Co.  
Docket Nos. 50-275 and 50-323  
License Nos. DPR-80 and DPR-82

Mr. John T. Conway  
Senior Vice President - Energy Supply and Chief Nuclear Officer  
Pacific Gas and Electric Company  
Diablo Canyon Power Plant  
77 Beale Street, Mail Code B32  
San Francisco, CA 94105

Donald C. Cook Nuclear Plant

Indiana Michigan Power Co.  
Docket Nos. 50-315 and 50-316  
License Nos. DPR-58 and DPR-74

Mr. Lawrence J. Weber  
Senior Vice President and Chief Nuclear Officer  
Indiana Michigan Power Company  
Nuclear Generation Group  
One Cook Place  
Bridgman, MI 49106

Dresden Nuclear Power Station

Exelon Generation Co., LLC  
Docket Nos. 50-237 and 50-249  
License Nos. DPR-19 and DPR-25

Mr. Michael J. Pacilio  
President and Chief Nuclear Officer  
Exelon Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

Duane Arnold Energy Center

NextEra Energy Duane Arnold, LLC  
Docket No. 50-331  
License No. DPR-49

Mr. Peter Wells  
Site Vice President  
NextEra Energy  
Duane Arnold Energy Center  
3277 DAEC Road  
Palo, IA 52324-9785

Edwin I. Hatch Nuclear Plant  
Southern Nuclear Operating Co.  
Docket Nos. 50-321 and 50-366  
License Nos. DPR-57 and NPF-5

Mr. Dennis R. Madison  
Vice President  
Southern Nuclear Operating Company, Inc.  
Edwin I. Hatch Nuclear Plant  
11028 Hatch Parkway North  
Baxley, GA 31513

Fermi  
Detroit Edison Co.  
Docket No. 50-341  
License No. NPF-43

Mr. Jack M. Davis  
Senior Vice President and Chief Nuclear Officer  
Detroit Edison Company  
Fermi 2 – 210 NOC  
6400 North Dixie Highway  
Newport, MI 48166

Fort Calhoun Station  
Omaha Public Power District  
Docket No. 50-285  
License No. DPR-40

Mr. David J. Bannister  
Vice President and Chief Nuclear Officer  
Omaha Public Power District  
444 South 16th St. Mall  
Omaha, NE 68102-2247

Grand Gulf Nuclear Station  
Entergy Operations, Inc.  
Docket No. 50-416  
License No. NPF-29

Mr. Michael Perito  
Vice President, Operations  
Entergy Operations, Inc.  
Grand Gulf Nuclear Station, Unit 1  
7003 Bald Hill Road  
Port Gibson, MS 39150

H. B. Robinson Steam Electric Plant  
Carolina Power & Light Co.  
Docket No. 50-261  
License No. DPR-23

Mr. Robert J. Duncan II  
Vice President  
Carolina Power & Light Company  
3581 West Entrance Road  
Hartsville, SC 29550

Hope Creek Generating Station  
PSEG Nuclear, LLC  
Docket No. 50-354  
License No. NPF-57

Mr. Thomas Joyce  
President and Chief Nuclear Officer  
PSEG Nuclear LLC - N09  
P. O. Box 236  
Hancocks Bridge, NJ 08038

Indian Point Energy Center  
Entergy Nuclear Operations, Inc.  
Docket Nos. 50-247 and 50-286  
License Nos. DPR-26 and DPR-64

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Buchanan, NY 10511-0249

James A. FitzPatrick Nuclear Power Plant  
Entergy Nuclear Operations, Inc.  
Docket No. 50-333  
License No. DPR-59

Mike Colomb  
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Entergy Nuclear Operations, Inc.  
James A. FitzPatrick Nuclear Power Plant  
P.O. Box 110  
Lycoming, NY 13093

Joseph M. Farley Nuclear Plant  
Southern Nuclear Operating Co.  
Docket Nos. 50-348 and 50-364  
License Nos. NPF-2 and NPF-8

Mr. Tom Lynch  
Vice President - Farley  
Southern Nuclear Operating Company, Inc.  
Joseph M. Farley Nuclear Plant  
7388 North State Highway 95  
Columbia, AL 36319

Kewaunee Power Station  
Dominion Energy Kewaunee, Inc.  
Docket No. 50-305  
License No. DPR-43

Mr. David A. Heacock  
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Dominion Energy Kewaunee, Inc.  
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LaSalle County Station  
Exelon Generation Co., LLC  
Docket Nos. 50-373 and 50-374  
License Nos. NPF-11 and NPF-18

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Limerick Generating Station  
Exelon Generation Co., LLC  
Docket Nos. 50-352 and 50-353  
License Nos. NPF-39 and NPF-85

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Millstone Nuclear Power Station

Dominion Nuclear Connecticut, Inc.  
Docket Nos. 50-336 and 50-423  
License Nos. DPR-65 and NPF-49

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Monticello Nuclear Generating Plant

Northern States Power Company  
Docket No. 50-263  
License No. DPR-22

Mr. Timothy J. O'Connor  
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Northern States Power Company - Minnesota  
Monticello Nuclear Generating Plant  
2807 West County Road 75  
Monticello, MN 55362-9637

Nine Mile Point Nuclear Station

Nine Mile Point Nuclear Station, LLC  
Docket Nos. 50-220 and 50-410  
License Nos. DPR-63 and NPF-69

Mr. Ken Langdon  
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Nine Mile Point Nuclear Station, LLC  
P. O. Box 63  
Lycoming, NY 13093

North Anna Power Station

Virginia Electric & Power Co.  
Docket Nos. 50-338 and 50-339  
License Nos. NPF-4 and NPF-7

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Oconee Nuclear Station

Duke Energy Carolinas, LLC

Docket Nos. 50-269, 50-270 and 50-287

License Nos. DPR-38, DPR-47 and DPR-55

Mr. Preston Gillespie

Site Vice President, Oconee Nuclear Station

Duke Energy Carolinas, LLC

7800 Rochester Highway

Seneca, SC 29672

Oyster Creek Nuclear Generating Station

Exelon Generation Co., LLC

Docket No. 50-219

License No. DPR-16

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Palisades Nuclear Plant

Entergy Nuclear Operations, Inc.

Docket No. 50-255

License No. DPR-20

Mr. Anthony J. Vitale

Site Vice President - Palisades

Entergy Nuclear Operations, Inc.

Palisades Nuclear Plant

27780 Blue Star Memorial Highway

Covert, MI 49043

Palo Verde Nuclear Generating Station

Arizona Public Service Company

Docket Nos. STN 50-528, STN 50-529 and STN 50-530

License Nos. NPF-41, NPF-51 and NPF-74

Mr. Randall K. Edington

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Arizona Public Service Co.

P. O. Box 52034, MS 7602

Phoenix, AZ 85072-2034



Peach Bottom Atomic Power Station

Exelon Generation Co., LLC

Docket Nos. 50-277 and 50-278

License Nos. DPR-44 and DPR-56

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Perry Nuclear Power Plant

First Energy Nuclear Operating Co.

Docket No. 50-440

License No. NPF-58

Mr. Vito A. Kaminskas

Site Vice President - Nuclear - Perry

FirstEnergy Nuclear Operating Company

Perry Nuclear Power Plant

10 Center Road, A290

Perry, OH 44081

Pilgrim Nuclear Power Station Unit No. 1

Entergy Nuclear Operations, Inc.

Docket No. 50-293

License No. DPR-35

Mr. Robert Smith

Vice President and Site Vice President

Entergy Nuclear Operations, Inc.

Pilgrim Nuclear Power Station

600 Rocky Hill Road

Plymouth, MA 02360-5508

Point Beach Nuclear Plant

NextEra Energy Point Beach, LLC

Docket Nos. 50-266 and 50-301

License Nos. DPR-24 and DPR-27

Mr. Larry Meyer

Site Vice President

NextEra Energy Point Beach, LLC

Point Beach Nuclear Plant, Units 1 & 2

6610 Nuclear Road

Two Rivers, WI 54241-9516

Prairie Island Nuclear Generating Plant

Northern States Power Co. Minnesota  
Docket Nos. 50-282 and 50-306  
License Nos. DPR-42 and DPR-60

Mr. Mark A. Schimmel  
Site Vice President  
Northern States Power Company - Minnesota  
Prairie Island Nuclear Generating Plant  
1717 Wakonade Drive East  
Welch, MN 55089-9642

Quad Cities Nuclear Power Station

Exelon Generation Co., LLC  
Docket Nos. 50-254 and 50-265  
License Nos. DPR-29 and DPR-30

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R. E. Ginna Nuclear Power Plant

R.E. Ginna Nuclear Power Plant, LLC  
Docket No. 50-244  
License No. DPR-18

Mr. Joseph E. Pacher  
Vice President  
R.E. Ginna Nuclear Power Plant, LLC  
R.E. Ginna Nuclear Power Plant  
1503 Lake Road  
Ontario, NY 14519

River Bend Station

Entergy Operations, Inc.  
Docket No. 50-458  
License No. NPF-47

Mr. Eric W. Olson  
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Entergy Operations, Inc.  
River Bend Station  
5485 U.S. Highway 61N  
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Salem Nuclear Generating Station

PSEG Nuclear, LLC

Docket Nos. 50-272 and 50-311

License Nos. DPR-70 and DPR-75

Mr. Thomas Joyce

President and Chief Nuclear Officer

PSEG Nuclear LLC - N09

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San Onofre Nuclear Generating Station

Southern California Edison Co.

Docket Nos. 50-361 and 50-362

License Nos. NPF-10 and NPF-15

Mr. Peter T. Dietrich

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Southern California Edison Company

San Onofre Nuclear Generating Station

P. O. Box 128

San Clemente, CA 92674-0128

Seabrook

NextEra Energy Seabrook, LLC

Docket No. 50-443

License No. NPF-86

Mr. Paul Freeman

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NextEra Energy Seabrook, LLC

c/o Mr. Michael O'Keefe

NextEra Energy Seabrook, LLC

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Seabrook, NH 03874

Sequoyah Nuclear Plant

Tennessee Valley Authority

Docket Nos. 50-327 and 50-328

License Nos. DPR-77 and DPR-79

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Tennessee Valley Authority

3R Lookout Place

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Chattanooga, TN 37402-2801

Shearon Harris Nuclear Power Plant

Carolina Power & Light Co.

Docket No. 50-400

License No. NPF-63

Mr. Christopher L. Burton

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Progress Energy Carolinas, Inc.

Shearon Harris Nuclear Power Plant

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New Hill, NC 27562-0165

South Texas Project

STP Nuclear Operating Co.

Docket Nos. 50-498 and 50-499

License Nos. NPF-76 and NPF-80

Mr. Edward D. Halpin

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STP Nuclear Operating Company

South Texas Project

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Wadsworth, TX 77483

St. Lucie Plant

Florida Power & Light Co.

Docket Nos. 50-335 and 50-389

License Nos. DPR-67 and NPF-16

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Surry Power Station

Virginia Electric & Power Co.

Docket Nos. 50-280 and 50-281

License Nos. DPR-32 and DPR-37

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Susquehanna Steam Electric Station

PPL Susquehanna, LLC  
Docket Nos. 50-387 and 50-388  
License Nos. NPF-14 and NPF-22

Mr. Timothy S. Rausch  
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769 Salem Boulevard  
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Three Mile Island Nuclear Station, Unit 1 (\* via corrected letter dated 3/13/12 - ML12073A366)

Exelon Generation Co., LLC  
Docket No. 50-289  
License No. DPR-50

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Turkey Point

Florida Power & Light Co.  
Docket Nos. 50-250 and 50-251  
License Nos. DPR-31 and DPR-41

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Vermont Yankee Nuclear Power Station

Entergy Nuclear Operations, Inc.  
Docket No. 50-271  
License No. DPR-28

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Entergy Nuclear Operations, Inc.  
Vermont Yankee Nuclear Power Station  
320 Governor Hunt Road  
Vernon, VT 05354

Virgil C. Summer Nuclear Station  
South Carolina Electric & Gas Co.  
Docket No. 50-395  
License No. NPF-12

Mr. Thomas D. Gatlin  
Vice President Nuclear Operations  
South Carolina Electric & Gas Company  
Virgil C. Summer Nuclear Station  
Post Office Box 88, Mail Code 300  
Jenkinsville, SC 29065

Vogtle Electric Generating Plant  
Southern Nuclear Operating Co.  
Docket Nos. 50-424 and 50-425  
License Nos. NPF-68 and NPF-81

Mr. Tom E. Tynan  
Vice President  
Southern Nuclear Operating Company, Inc.  
Vogtle Electric Generating Plant  
7821 River Road  
Waynesboro, GA 30830

Vogtle Electric Generating Plant, Units 3 & 4  
Southern Nuclear Operating Co.  
Docket Nos. 52-025 and 52-026  
License Nos. NPF-91 and NPF-92

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Bin B022  
Birmingham, AL 35242

Waterford Steam Electric Station  
Entergy Operations, Inc.  
Docket No. 50-382  
License No. NPF-38

Ms. Donna Jacobs  
Vice President, Operations  
Entergy Operations, Inc.  
Waterford Steam Electric Station, Unit 3  
17265 River Road  
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Watts Bar Nuclear Plant, Unit 1

Tennessee Valley Authority  
Docket No. 50-390  
License No. NPF-90

Mr. Preston D. Swafford  
Chief Nuclear Officer and Executive Vice President  
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1101 Market Street  
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Watts Bar Nuclear Plant, Unit 2

Tennessee Valley Authority  
Docket No. 50-391  
Construction Permit No. CPPR No. 092

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Tennessee Valley Authority  
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Chattanooga, TN 37402-2801

William B. McGuire Nuclear Station

Duke Energy Carolinas, LLC  
Docket Nos. 50-369 and 50-370  
License Nos. NPF-9 and NPF-17

Mr. Regis T. Repko  
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12700 Hagers Ferry Road  
Huntersville, NC 28078

Wolf Creek Generating Station

Wolf Creek Nuclear Operating Corp.  
Docket No. 50-482  
License No. NPF-42

Mr. Matthew W. Sunseri  
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Wolf Creek Nuclear Operating Corporation  
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REQUIREMENTS FOR MITIGATION STRATEGIES FOR BEYOND-DESIGN-BASIS  
EXTERNAL EVENTS AT OPERATING REACTOR SITES  
AND CONSTRUCTION PERMIT HOLDERS

This Order requires a three-phase approach for mitigating beyond-design-basis external events. The initial phase requires the use of installed equipment and resources to maintain or restore core cooling, containment and spent fuel pool (SFP) cooling capabilities. The transition phase requires providing sufficient, portable, onsite equipment and consumables to maintain or restore these functions until they can be accomplished with resources brought from off site. The final phase requires obtaining sufficient offsite resources to sustain those functions indefinitely.

- (1) Licensees or construction permit (CP) holders shall develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment and SFP cooling capabilities following a beyond-design-basis external event.
- (2) These strategies must be capable of mitigating a simultaneous loss of all alternating current (ac) power and loss of normal access to the ultimate heat sink and have adequate capacity to address challenges to core cooling, containment, and SFP cooling capabilities at all units on a site subject to this Order.
- (3) Licensees or CP holders must provide reasonable protection for the associated equipment from external events. Such protection must demonstrate that there is adequate capacity to address challenges to core cooling, containment, and SFP cooling capabilities at all units on a site subject to this Order.
- (4) Licensees or CP holders must be capable of implementing the strategies in all modes.
- (5) Full compliance shall include procedures, guidance, training, and acquisition, staging, or installing of equipment needed for the strategies.



REQUIREMENTS FOR MITIGATION STRATEGIES  
FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS  
AT COL HOLDER REACTOR SITES  
(VOGTLE UNITS 3 AND 4)

Attachment 2 to this order for Part 50 licensees requires a phased approach for mitigating beyond-design-basis external events. The initial phase requires the use of installed equipment and resources to maintain or restore core cooling, containment and spent fuel pool (SFP) cooling capabilities. The transition phase requires providing sufficient, portable, onsite equipment and consumables to maintain or restore these functions until they can be accomplished with resources brought from off site. The final phase requires obtaining sufficient offsite resources to sustain those functions indefinitely.

The design bases of Vogtle Units 3 and 4 includes passive design features that provide core, containment and SFP cooling capability for 72 hours, without reliance on alternating current (ac) power. These features do not rely on access to any external water sources since the containment vessel and the passive containment cooling system serve as the safety-related ultimate heat sink. The NRC staff reviewed these design features prior to issuance of the combined licenses for these facilities and certification of the AP1000 design referenced therein. The AP1000 design also includes equipment to maintain required safety functions in the long term (beyond 72 hours to 7 days) including capability to replenish water supplies. Connections are provided for generators and pumping equipment that can be brought to the site to back up the installed equipment. The staff concluded in its final safety evaluation report for the AP1000 design that the installed equipment (and alternatively, the use of transportable equipment) is capable of supporting extended operation of the passive safety systems to maintain required safety functions in the long term. As such, this Order requires Vogtle Units 3 and 4 to address the following requirements relative to the final phase.

- (1) Licensees shall develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment and SFP cooling capabilities following a beyond-design-basis external event.
- (2) These strategies must be capable of mitigating a simultaneous loss of all ac power and loss of normal access to the normal heat sink and have adequate capacity to address challenges to core cooling, containment, and SFP cooling capabilities at all units on a site subject to this Order.
- (3) Licensees must provide reasonable protection for the associated equipment from external events. Such protection must demonstrate that there is adequate capacity to address challenges to core cooling, containment, and SFP cooling capabilities at all units on a site subject to this Order.
- (4) Licensees must be capable of implementing the strategies in all modes.
- (5) Full compliance shall include procedures, guidance, training, and acquisition, staging, or installing of equipment needed for the strategies.

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